and the Interview of Dec. 18, 2002

REMARKS

In response to the Final Office Action mailed October 3, 2002, the Applicant requests the following amendments: Applicant agrees with the Interview Summary Description

Claim 1 is amended to be amended to remove references to smoothness on the order of a light wavelength but "specular" is retained. Claim 7 is canceled.

A paragraph on page 11, about chrome plating, is requested to be deleted because the Applicant now believes that is it incorrect. In response the Office Action:

[3] Claims 1, 5, and 7 were rejected under §102 over Williams '071. This rejection is respectfully traversed.

Williams discloses a hard coating on a surface of stainless steel, and states (col. 2, line 36): "Whilst the surface finish of the blank is not critical, it is highly desirable that it is not highly polished and not overly rough. It is therefore preferred that the surface finish [is between] 0.1 RA and 2.0 RA."

Claim 1 as amended recites a surface that is "specular." The Applicant's specification at page 12, line 1, states that "if [a] surface is specular it is also smooth to less than a wavelength of light, which is about 0.5 μm." But the Applicant now solicits the Examiner's consideration of the attached materials showing that "specular" also implies a smoothness to less than the 0.*1* μm (roughly equal to the "0.1 RA") disclosed by Williams.

Surface Roughness and Scattering, by **Bennett and Mattsson**, deals with the relationship between surface finish and specularity.

(1) The Examiner is first invited to note the statement at page 3, column 1, line 17, that a roughness of 0.1 μm (the lower limit of Williams' disclosed range) is typical of machined surfaces and that optical surfaces (i.e. specular surfaces) are smoother. (This statement conforms with other references, discussed below.)

(2) Fig. 9 on page 25 shows an experimental setup for finding the ratio of scattered light to total light ("TIS"), using laser beams. Since the total light is the sum of the scattered light and the specularly-reflected light, the higher this fraction is, the less specular is the surface.

A theoretical prediction relating roughness to specular reflection is shown in Fig. 10 on page 26. The vertical axis is the TIS fraction, and the horizontal axis is rms roughness in Angstroms. The middle line on the graph is visible light (red He-Ne laser light, 0.633 μm wavelength), the others are infrared and ultraviolet. The theoretical prediction of Fig. 10 is experimentally verified, within the range of interest (page 27, lines 9-11).

The roughness measure rms of Fig. 10 is shown by the Salmon reference (discussed below) to be close to R_a, which the Examiner takes to be the same as the "RA" of Williams.

On the page of the Applicant's attachment following page 26, the Applicant has extrapolated the graph of Fig. 10 toward rms = 0.1 μm (1000 Angstroms), by pasting on a photocopy of the lower axis. The extrapolated graph shows that, when rms = 500 Angstroms (i.e., 0.05 μm), *all* of the light is scattered. The quantity TIS on the vertical axis is defined as the ratio of scattered to total light, so when TIS equals 10^0 (i.e., 1), the scattered light is equal to the scattered light plus the specularly reflected light—which means that there is no specular reflection at all.

Even for the infrared light of wavelength 1.0 μm, there is no reflection at all when the surface finish is "0.1 RA" as taught by Williams.

(3) Table 2 on page 36 shows polished surfaces with roughness less than 0.00051 μm. This shows that a typical polished, optical, specular surface is far below Williams' range.

(4) On page 39, under heading 4.A.2, the authors state that R_a is the usual figure for machined surfaces, not for optical surfaces. This implies that Williams discloses machined, not optical surfaces, because its uses that measure (i.e., "RA")..

(5) On page 48, the third paragraph in the first column, together with the second column on page 38, supports the Applicant's argument (Amendment of July 1, 2002, page 3) that RA alone is not directly related to specularity, because L is not determinate.

Modern Grinding Process Technology, by **Salmon**, shows in Fig. 11.2 (fourth page of the attachment) that RMS is nearly the same as R_a (as noted above).

Grinding and Polishing Theory and Practice, by **Burkart/Schmotz**, shows a polished (specular) surface in Fig. 21 on page 24 with a surface roughness less than "10 AE." The abbreviation "AE" is believed to have appeared in the original German diagram, and to stand for "Angstrom Einheit"("Angstrom Unit"); pages from a dictionary and an encyclopedia are attached in support of this translation.

Mechanical Polishing by **Burkart, Silman, and Draper** shows in Fig. 14 on page 18 a graph of a polished surface showing peak-to-valley roughness of 0.05 μm. The RMS or R_a roughness would be smaller than that; the Examiner is invited to note Salmon Fig. 11.2.

As the Applicant previously noted, Williams teaches against a "highly polished" surface as the only exception to the lack of criticality, which is also taught. In view of the new information above, Williams discloses a honed surface that is not at all specular. Thus, Williams does not anticipate.

[4] Claims 1-3, 6, and 7 are rejected under §103 over Bache '058 in view of Lane '329. This rejection is respectfully traversed on the grounds of record, i.e., that the rejection is based on guesswork by Lane and further guesswork by the Examiner. The Examiner speculates that Lane's imaginary skittering molecules will form a specular surface, but there is no support for this either in the reference or by way of reasoned argument.

[5] Claims 1, 2, and 4 are rejected under §103 over Lane '579. This rejection is respectfully traversed on the grounds that the Examiner has not provided a reference to support any of the assertions made on the basis of Official Notice, as is required by the MPEP.

[6] As noted above, several portions of Bennett and Mattsson support the Applicant's previous arguments, which are respectfully maintained.

The Examiner asserts that chromium is known to be specular. The Applicant respectfully traverses on the basis of his personal information, gained in making the model referred to in the attached affidavit. The Applicant was informed by Hard Chrome Specialists in York, PA (who plated the model) that the underlying surface would need to be polished if the chromium plating were to be specular.

The Applicant submits an affidavit showing the superior results of the model referred to above, which embodies the subject matter of claims 1-3, 5, and probably 6.

Allowance of all claims under consideration is respectfully solicited.

Respectfully submitted,

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VERSION WITH MARKINGS TO SHOW CHANGES

IN THE CLAIMS

1. (Amended) A blade, comprising:

a substrate including a specular surface [, whereby the surface is smooth on the order of a light wavelength]; and

a thin, hard plate deposited on the specular surface, whereby the hard plate is microscopically flat [, on the order of a light wavelength];

wherein the substrate is beveled toward a cutting edge including the hard plate, whereby the cutting edge is microscopically straight [, on the order of a light wavelength,] in a cutting direction.

AFFIDAVIT IN SUPPORT OF PATENT APPLICATION 09/708,658

I, Fran Galvin, state as follows:

I received Nick Bromer's prototype knife on Thanksgiving Day, November 28, 2002. The knife blade was inserted into a utility knife handle. The knife blade is approximately 4 inches long, in the shape of a kitchen chef knife, has a yellowish silver coating, and is sharpened on one side.

My wife, Debra Galvin and myself used the knife for over two weeks. We started using the knife as a kitchen knife. It terms of sharpness the knife did not dull during that period. I did notice that the knife tended to cut at an angle when cutting onions and carrots. It produced fine thin slices from soft store bought tomatoes. We used it on a wooden cutting board.

Because the kitchen application didn't test the limits of the knife's sharpness, I decided to use the knife in a home repair application. I recently replaced the baseboard woodwork in my dining room. The new woodwork was thicker than the old. This left the wall-to-wall carpeting too large and requiring trimming. I had performed this same task previously in the living room using standard utility knife blades. The standard utility knife blades dulled from what I surmise was the toughness of the carpet backing.

Carpet is a group of fibers spun and adhered to a fiber mesh backing. I suspect that the adhesive and backing are sufficiently hard to dull utility knife blades. Nick Bromer's prototype knife did not dull after cutting through approximately 50 linear feet of carpet. I then washed and continued to use the knife in the kitchen. The knife sharpness was the same as when we started using it. It still produced very fine thin slices from soft store bought tomatoes with ease. I never sharpened or honed the knife during this period.

As of the time of writing this affidavit I still have the knife. I will be returning the knife to Nick on Monday, Dec. 16, 2002.

All statements made herein of my own knowledge are true and were made with the knowledge that willful false statements and the like are punishable by fine or imprisonment, or both, under 18 U.S.C. § 1001, and may jeopardize the validity of the application or any patent issuing thereon.

Francis X. Galvin

Francis X. Galvin

Dec. 15, 2002